

# Claims

- [c1] 1. A particle sensor comprising:  
a light detection device;  
a housing in communication with said light detection device; and,  
a first concave reflective surface on said housing.
- [c2] 2. The device of claim 1 wherein said light detection device is circumscribed by said housing.
- [c3] 3. The device of claim 1 wherein said light detection device is a photodiode.
- [c4] 4. The device of claim 1 wherein said reflective surface is gold.
- [c5] 5. The device of claim 1 wherein said light detection device is recessed below said concave reflective surface.
- [c6] 6. The device of claim 1 wherein said light detection device is raised above said first concave reflective surface.
- [c7] 7. The device of claim 1 wherein said light detection device forms the center of said concave reflective surface.
- [c8] 8. The device of claim 1 wherein said reflective surface

has a first focal point and a second focal point defining a first axis of symmetry.

[c9] 9. The device of claim 8 wherein said light detection device is located in the center of said first axis of symmetry.

[c10] 10. The device of claim 8 further comprising:  
a second reflective surface having a concave ellipsoidal shape;  
wherein said second reflective surface has a first focal point and a second focal point defining a second axis of symmetry;  
wherein said first symmetry of axis and said second axis of symmetry are coaxial.

[c11] 11. The device of claim 10 further comprising:  
a means for conducting a gas stream with small particles through the said first focal point of said second reflective surface; and,  
a means for projecting light through the said first focal point of said second reflective surface.

[c12] 12. A particle sensor comprising:  
a first reflective surface having a concave shape;  
wherein said first reflective surface has a first focal point and a second focal point defining a first axis of symme-

try;

a second reflective surface having a concave ellipsoidal shape;

wherein said second reflective surface has a first focal point and a second focal point defining a second axis of symmetry; and,

wherein said first symmetry of axis and said second axis of symmetry are coaxial.

- [c13] 13. The device of claim 12 further comprising:  
a means for conducting a gas stream with small particles through the said first focal point of said second reflective surface; and,  
a means for projecting light through the said first focal point of said second reflective surface.
- [c14] 14. The device of claim 13 wherein said second focal point of said second reflective surface is located on said first reflective surface at said first axis of symmetry.
- [c15] 15. The device of claim 13 wherein said first focal point of said first mirror is coincident with said first focal point of said second mirror.
- [c16] 16. The device of claim 13 wherein said second focal point of said first mirror is coincident with said second reflecting surface at said first axis of symmetry.

- [c17] 17. The device of claim 13 wherein said means for detecting light is located on said first mirror coincident with said first axis of symmetry.
- [c18] 18. The device of claim 13 further comprising:  
a light detection device in communication with said first reflective surface;  
wherein said first reflective surface is spherical;  
wherein said light detection device is centered on said first axis of symmetry;  
wherein the radius of curvature for said first reflective surface is equal to the distance between said light detection device at said first axis of symmetry and said first focal point of said second reflective surface.
- [c19] 19. The device of claim 1 further comprising:  
a second concave spherical reflective surface with a second principal axis;  
wherein said first concave reflective surface is spherical with a first principal axis;  
wherein said first principal axis and said second principal axis are co-axial;  
a means for conducting a gas stream with small particles through the said second principal axis of said second reflective surface;  
a means for projecting light through the said second

principal axis of said second reflective surface intersecting said gas stream with small particles defining a first intersection point;

wherein the said second concave reflective surface's image location of said first intersection point is at the center of said light detection device; and,

wherein the said first concave reflective surface's radius of curvature is equal to the distance between said first intersection point and said first concave reflective surface where it intersects with said first principal axis.

[c20] 20. The device of claim 1 further comprising:  
a second reflective surface having a concave shape configured to reflect light opposite said first concave reflective surface.